



Ortega-Avila, A. G., Papadaki, A., & Jago, R. (2019). The role of the home environment in sugar-sweetened beverage intake among northern Mexican adolescents: a qualitative study. *Journal of Public Health (Germany)*, 27(6), 791-801. <https://doi.org/10.1007/s10389-018-0993-6>

Publisher's PDF, also known as Version of record

License (if available):
CC BY

Link to published version (if available):
[10.1007/s10389-018-0993-6](https://doi.org/10.1007/s10389-018-0993-6)

[Link to publication record in Explore Bristol Research](#)
PDF-document

This is the final published version of the article (version of record). It first appeared online via Springer at <https://link.springer.com/article/10.1007%2Fs10389-018-0993-6> . Please refer to any applicable terms of use of the publisher.

University of Bristol - Explore Bristol Research

General rights

This document is made available in accordance with publisher policies. Please cite only the published version using the reference above. Full terms of use are available:
<http://www.bristol.ac.uk/red/research-policy/pure/user-guides/ebr-terms/>



The role of the home environment in sugar-sweetened beverage intake among northern Mexican adolescents: a qualitative study

Ana G. Ortega-Avila¹ · Angeliki Papadaki¹ · Russell Jago¹

Received: 27 April 2018 / Accepted: 22 October 2018
© The Author(s) 2018

Abstract

Aim To explore adolescents' perceptions of how the home environment promotes the intake of sugar-sweetened beverages (SSBs) and to identify the potential environmental cues that trigger SSB intake at home.

Subjects and methods Twenty-nine semi-structured interviews were conducted among adolescents, aged 15–19 years, residing in an urban area in Northwest Mexico. Thematic analysis was used to analyse the data.

Results Adolescents perceived that the availability of SSBs in the household increased their intake of SSBs. Availability of SSBs was facilitated mainly by taste preferences, ease of buying and beliefs that fruit-containing SSBs are healthy. Availability at home was considered important because SSBs were normally consumed with food during meals. Family influences and a lack of parental regulation were also regarded as factors promoting adolescents' SSB intake at home. Drinking SSBs with food and having SSBs available at home were identified as habits that had been performed by participants' families for many years.

Conclusions These findings provide insights into the role of the home and family environment in promoting SSB intake. Future interventions to reduce SSB intake in this sample of Mexican adolescents should address availability and facilitators of SSB intake at home, family influences and parental regulation.

Keywords Sugar-sweetened beverages · Home environment · Mexican adolescents

Introduction

According to the latest Mexican National Health and Nutrition Survey 2016 (ENSANUT from its Spanish-language acronym), the combined prevalence of obesity and overweight among Mexican adolescents (aged 12–19 years) reached 36.3% in 2016 (Hernández Ávila et al. 2016). Evidence has suggested a positive association between a high intake of sugar-sweetened beverages (SSBs) and weight gain in adolescence (Jimenez-Aguilar et al. 2009; Malik et al. 2013). In 2012, per capita intake of SSBs among adolescents was approximately 497.8 ml/day (Stern et al. 2014)—two times higher than adolescents' average SSB intake in the UK

(212 ml/day) (Bates et al. 2016). Despite the epidemiological research conducted in Mexico around the consumption patterns of SSBs (Barquera et al. 2008, 2010; Jimenez-Aguilar et al. 2009; Stern et al. 2014; Sánchez-Pimienta et al. 2016), less evidence is available on the individual, social and physical environmental factors determining the intake of SSBs in Mexican youth. This is important because an understanding of these factors could not only reshape and redirect current fiscal policies (SSB tax) but also contribute to the design of complementary interventions to reduce SSB intake in this group.

Previous research on adolescents' proximal context, such as family, school and peers, has suggested a positive association between the home and school environments and SSB intake (van der Horst et al. 2008; Ezendam et al. 2010; Shi 2010; Tak et al. 2011; Bogart et al. 2017). Within the home environment, factors such as the availability and accessibility of SSBs, family meals, parental modelling, parenting practices and family food rules have been positively correlated with the intake of SSBs among children and adolescents living in developed countries (Grimm et al. 2004; van der Horst et al. 2007; Bere et al. 2008; Haerens et al. 2008; Ezendam et al. 2010; Verzeletti et al. 2010; Tak et al. 2011; Hebden et al.

Electronic supplementary material The online version of this article (<https://doi.org/10.1007/s10389-018-0993-6>) contains supplementary material, which is available to authorized users.

✉ Ana G. Ortega-Avila
a.ortegaavila@bristol.ac.uk

¹ Centre for Exercise, Nutrition and Health Sciences, School for Policy Studies, University of Bristol, 8 Priory Road, Bristol BS8 1TZ, UK

2013; Van Lippevelde et al. 2013; Bogart et al. 2017). These findings provide an important insight into the factors that influence SSB intake at home in developed countries, mostly in Europe. However, less is known about the potential role of the home environment in the intake of SSBs among Mexican adolescents. Addressing this gap is important because cultural and family norms around food in Mexico are different from those in Europe.

Habit strength has also been associated, both directly and indirectly, with European adolescents' SSB intake (Kremers et al. 2007; van der Horst et al. 2007; Tak et al. 2011; van de Gaar et al. 2017), which suggests that SSB intake could be a habit-triggered behaviour. According to Gardener et al. (2014), habit is defined as "a process whereby environmental cues automatically activate an unconscious impulse to perform a behaviour that has, through repetition, become associated with those cues" (Gardner et al. 2014). Thus, if SSB intake is a habitual behaviour, it is likely that this habit has been formed through context-dependent repetition. However, less is known about in which contexts, or under which conditions, habits might be triggered (e.g. home, school, other places). Identifying the different circumstances in which the habit of drinking SSBs might be triggered would be useful in the design of future interventions that aim to reduce SSB intake in Mexican adolescents.

To bridge the aforementioned gaps in the evidence base, and in view of the fact that adolescents living in the North of Mexico consume a considerable amount of SSBs (Jimenez-Aguilar et al. 2009; Sánchez-Pimienta et al. 2016), this study used qualitative methods to explore in depth: (1) the context of consuming SSBs in the home environment and (2) the potential contextual cues or other stimuli that trigger SSB intake at home.

Methods

Participants

Semi-structured interviews were conducted in the city of Hermosillo, Mexico, between April and May 2016. The study was approved by the University of Bristol, School for Policy Studies Research Ethics Committee (SPS REC 14–15. A16). Detailed information on the design, recruitment and data collection can be found elsewhere (Ortega-Avila et al. 2018). In brief, 391 adolescents who had taken part in a previous cross-sectional study assessing SSB intake (unpublished results) were contacted again, this time in order to participate in an interview. Purposive sampling was used, where inclusion criteria were: adolescents, males and females between 15 and 19 years who consumed at least one portion (240 ml) of SSBs per day. SSB intake had been previously assessed through an online survey (unpublished results), using an

adapted beverage intake questionnaire (BEVQ) comprising 16 beverage items (Hedrick et al. 2012). A pragmatic approach was followed with the objective of achieving an initial medium-sized subject pool of 30 SSB consumers (Baker and Edwards 2012). Participants provided written informed consent prior to the interview and received \$100 Mexican pesos (approximately \$5, £4) at the end of the interview.

Data collection

A total of 29 interviews were conducted at participants' homes or in public spaces. They were conducted in Spanish by the lead author, who is a native of the city and trained and experienced in conducting qualitative research. Interviews lasted an average of 35 min (range: 27–50 min). Different topics regarding SSB intake were discussed, including SSB intake in different contexts, such as home and out-of-home, as well as perceptions of the current SSB taxation (Ortega-Avila et al. 2018). The semi-structured interview guide (translated into English) is presented in Table 1, and the Spanish version is presented in Supplementary Material online, Appendix 1. The present study reports findings on adolescents' perceptions of SSB intake in the home environment.

For the purpose of recruitment, interviews and data analysis, the definition of SSBs comprised any carbonated and non-carbonated drinks containing added sugars (sugars added during the production process or home preparation) (Erickson and Slavin 2015). This included sodas, fruit juices (excluding 100% fruit juices), fruit-flavoured drinks, sports and energy drinks and sweetened coffee/tea. Traditional Mexican beverages called *aguas frescas* were also included, as they are prepared with water, fresh fruit and sugar. Aguas frescas can be prepared at home or purchased at restaurants and markets and from street vendors. Notes were taken, and at the end of each interview the interviewer summarised the discussion points to confirm the accuracy of the recorded statements with the participants. All interviews were recorded, anonymised and transcribed verbatim. As this was an exploratory study, the 29 interviews conducted were sufficient to capture a range of participant perceptions and responses regarding SSB intake in the home environment and to reach code saturation, with no new themes emerging from the analysis.

Data analysis

Using data collected via an online survey completed during our earlier cross-sectional work (unpublished results), descriptive statistics (means and standard deviations) were used to describe personal and socio-demographic characteristics as well as daily SSB intake of participants. These analyses were performed using Stata 14 (Statacorp, College Station, TX).

Table 1 Semi-structured interview guide exploring sugar-sweetened beverage intake in the home environment

Questions in English
1. Can you describe what beverages you and your family drink at home? <i>Probe: If I go to your house, what beverages can I find in the fridge?</i>
2. Who buys or prepares these beverages in your home?
3. Where are these beverages normally purchased?
4. When you, your parents or other family members buy SSBs, what amounts are normally bought? <i>Probe: Just one bottle/a few bottles for the week/a big box/only what we need for that day</i>
5. What are the reasons for buying/preparing these beverages at home?
6. How does your family decide what they want to buy/prepare to drink? <i>Probe: Do you decide this as a family or is it an individual choice?</i>
7. How important is it for you or your family to have sugary drinks at home? <i>Probe: Why do you think it matters (or not)?</i>
8. How similar or different are your drinking preferences in relation to your parents/family? <i>Probe: Why is that?</i>
9. Do you drink these kinds of beverages with members of your family? <i>Probe: Do you share SSBs as a family at home? During meals, family time, at weekends?</i>
10. How much freedom do you have to decide what you want to drink in your house? <i>Probe: Would you say that your parents usually tell you what to drink?</i>
11. How much do you think your family have influenced you about what you drink? <i>Probe: Why do you think that?</i>
12. Do you or your family have an SSB tradition? <i>Probe: Have you or your family have been drinking SSBs for many years?</i>
13. When you are at home, how long do you take to decide what you are going to drink?
Instruction: To ask only if the adolescent mentioned not having sugary drinks available at home
14. What do you think are the reasons for SSBs not being available in your home? <i>Probe: Is there a family rule, do your parents/family not drink SSBs?</i>
SSB sugar-sweetened beverage

Data collection and analysis proceeded in parallel. To prevent misinterpretation of participant statements, it is recommended to conduct qualitative analysis in the original language (Birbili 2000; van Nes et al. 2010; Al-Amer et al. 2015). Therefore, the analysis of the interview transcripts was conducted in Spanish. Only themes titles and theme-relevant quotes were translated into English by the researcher who conducted the interviews and who was a native Spanish speaker. They were back-translated into Spanish by an independent bilingual researcher to check for accuracy (Birbili 2000; Esposito 2001). Relevant quotes are presented in English in this article and in Spanish in the Supplementary Material online (Appendix 2) (Lincoln et al. 2016). Each quote was allocated a quote number (Q1–Q52) for identification purposes in the Spanish version in the Supplementary Material online, as well as a participant number (P1–P29), and was supplemented in the current report by gender (male/female) and age.

Thematic analysis of the interview transcripts, using the framework approach, was used to evaluate the data. This method allowed descriptive and exploratory themes that

facilitated an understanding of the intake of SSBs within the home environment to be extracted, while retaining a clear audit trail to the original data (Smith and Firth 2011; Gale et al. 2013). The framework approach followed five stages: (1) familiarisation, (2) coding, (3) development of analytical framework, (4) indexing and (5) charting. The detailed steps followed during the analysis are described in Table 2. The qualitative analysis was carried out using NVivo (version 10, QRS International Pty Ltd., UK).

Results

In total, 29 adolescents [13 males, 16 females, ranging in age between 15 and 19 years (mean = 17.0; SD = 1.4)] participated in the interviews. Detailed personal characteristics are presented in Table 3. On average, participants had a normal body mass index (BMI) and came from a middle socio-economic status (SES) background. The mean SSB intake was 1020 ml/day. The final framework consisted of 17 subthemes clustered into five themes (Table 4).

Table 2 Framework approach procedure for analysing interview data

Stages	Procedure
(1) Familiarisation	Familiarisation started with the verbatim transcription of the data, followed by reading the transcripts repeatedly
(2) Coding	Two trained Mexican researchers independently coded an initial number of transcripts ($n = 3$) to validate the coding process
(3) Development of an analytical framework	Coding was discussed in several meetings until both coders agreed on a set for forming the analytical framework. This was then independently applied to three more interviews, where new codes, themes and nuances were considered to refine it
(4) Indexing	The analytical framework was systematically applied to the rest of the transcripts
(5) Charting	Codes and interview data were organized into a chart to facilitate interpretation

Context of SSB availability at home

The presence of SSBs was something common in adolescents' households, as nearly all participants mentioned that different SSBs were available at home. Very few participants mentioned not having SSBs in their homes and referred only to the accessibility of other beverages, such as water, milk and non-caloric powdered beverages:

"There is always iced tea in my house; also, there are always juices." (Q1/P16/female/16 years)

"We always have juice at home, soda and iced tea." (Q2/P18/male/17 years)

The availability of SSBs at the household level varied across participants and was either through purchase or home preparation. SSB purchases were generally made at the supermarket during the weekly grocery shopping or every day in shops near home:

"Beverages are normally bought in the shop near the house, because it's the fastest." (Q3/P13/male/19 years)
 "We buy beverages when we buy the groceries." (Q4/P27/female/16 years)

Table 3 Socio-demographic characteristics and sugar-sweetened beverage intake (ml/day) of Mexican adolescents

	Total ($n = 29$)	
	Mean	SD
Age (years)	17.0	1.4
Weight (kg)	63.3	13.0
Height (metres)	1.68	0.10
Body mass index (kg/m^2)	22.3	4.4
SES (0–10) ^a	5.6	2.5
Mean daily intake of SSBs (ml/day)		
Sweetened juices/fruit drinks	368.3	442.7
Regular soda	189.3	169.2
Aguas frescas	325.7	419.6
Sweetened iced teas	259.5	376.6
Coffee/tea with sugar	242.4	277.9
Sports and energy drinks	256.6	419.6
Total SSBs	1020.8	1297.6

SD standard deviation, SSB sugar-sweetened beverage

^a Socio-economic status (SES) assessment was based on an asset index comprising availability of basic and non-basic goods and durables and educational attainment of the household head, with 0 indicating the lowest and 10 indicating the highest SES

The role of parents, especially mothers, was of key importance since they were commonly in charge of buying or preparing SSBs on a daily or weekly basis:

"My mom is the one who takes care of it; normally when she goes to the supermarket she buys them [SSBs]." (Q5/P24/male/17 years)
 "My mom is the one who goes to the supermarket and makes the beverages." (Q6/P15/female/19 years)

To a lesser degree, fathers also played a role in the availability of SSBs at home:

"My dad, it's like he says: 'Mm...a soda' or 'We need iced tea'. It's because he likes sweet things." (Q7/P28/female/17 years)
 "Sometimes my dad arrives home with sodas and it causes chaos." (Q8/P15/female/19 years)

In a few cases, purchasing of SSBs was split between all family members:

Table 4 Themes and subthemes that emerged during the interviews

Theme	Subthemes
(1) Context of SSB availability at home	Home availability Limited availability Family roles for purchase and preparation Decision-making
(2) Facilitators of SSB availability at home	Ease of purchase Aguas frescas/juices ‘health halo’ Taste preference
(3) Perceived importance of having SSB at home	Food intake Taste Sugar craving
(4) Role of family in SSB intake at home	Family health awareness Family preferences Family rules Family influence
(5) SSB intake as habitual behaviour in the home environment	Habits and family norms Cue-eating occasions Cue availability

SSB sugar-sweetened beverage

“We take turns; sometimes my brother buys them, or I buy them or my mom.” (Q9/P27/female/16 years)

Decision-making processes about beverage availability mostly involved all household members, but the parents were normally the ones responsible for purchasing them. This indicates that agreements regarding what beverages are available at home did not necessarily depend on one family member and that the different beverage preferences were considered by the parents prior to purchase:

“Well, we all decide, but they [parents] are the ones who buy the groceries right now and we get what they buy. But if I say: ‘I would like this to drink’, they will buy it.” (Q10/P11/female/19 years).
“It’s decided by a majority of votes.” (Q11/P25/female/17 years)

However, some adolescents thought that their parents were the ones who decided what types of beverages would be available to them in the household:

“Indirectly, it’s their [the parents’] decision, because they buy three types of drinks for the house; each of us chooses what we are going to drink, but they are the ones who buy them [SSBs].” (Q12/P13/male/19 years)

“It’s almost always my dad who decides.” (Q13/P17/female/15 years)

“My parents decide together what is going to be available to drink...they never ask.” (Q14/P1/male/15 years)

Facilitators of SSB availability in the house

Home availability of different SSBs seemed to be affected by three different factors. One that facilitated the availability of fruit-containing beverages or fruit-flavoured drinks, independent of sugar content, was the perception that these were healthier than artificially flavoured drinks, and thus they were considered an acceptable beverage to have at home. This seemed to favour the intake of *aguas frescas* and sweetened juices. Preferring *aguas frescas* over other beverages, including water, was reported as a way to improve diet, and this was achieved through a shift from industrialised to home-made SSBs:

“It’s not natural juice but it’s better than the soda.” (Q15/P18/male/17 years)

“If we drink Jamaica [hibiscus water] it’s with brown sugar; my family try to make beverages healthy, and it’s like ‘Let’s not drink soda.’” (Q16/P2/female/15 years)

“I drink a beverage that does not contain gas, and according to me it’s not as harmful as [soda brand].” (Q17/P4/male/16 years)

Second, the availability of bottled SSBs at home was facilitated by the ease of buying them rather than preparing beverages (mostly *aguas frescas*). Buying bottled SSBs was perceived as a good alternative when there was no time to make “healthier” beverages:

“It is faster to buy soda than to prepare a beverage.” (Q18/P19/male/18 years)

“If they don’t have time to make lemonade they buy something...if there is nothing to drink we go to the [mini-market name] and buy flavoured sodas. That’s what we buy when we don’t have time.” (Q19/P29/female/16 years)

Third, taste preferences for SSBs also appeared to promote their availability at home. Adolescents perceived that they and their family members had a strong preference for SSBs, thereby facilitating availability due to their high acceptance:

“I say they [the family] drink soda because they like the taste of it, because they drink [soda brand] they like its

taste. When they change to juices or lemonades and flavoured waters it is also because of the taste. They get fed up with one flavour and then change to another flavour, but it is the taste, I would say.” (Q20/P13/male/19 years)

“My brother says it’s [soda] really tasty and, according to him, he cannot stop drinking [soda]. I think it is because it’s sweet and because it’s sparkling.” (Q21/P28/female/17 years)

Perceived importance of having SSBs at home

Many participants believed that having SSBs at home was something important:

“It’s very important, because if there is no soda it’s like not eating; we stop feeling hungry...if there is no soda it’s like someone needs to go and buy some, otherwise we don’t eat.” (Q22/P18/male/17 years)

Adolescents who thought it was crucial to have SSBs at home reported taste and sugar cravings as important reasons:

“I’m the one who gives priority to that [SSBs] because of the taste, because I like the sweetness.” (Q23/P20/male/17 years)

“Sometimes when I’m craving something sweet, I drink juice.” (Q24/P6/male/16 years)

Nonetheless, the most prevalent reason was that SSBs complemented food intake. Nearly all participants emphasized the importance of accompanying food with sweet drinks rather than plain water:

“Drinks [SSBs] are to accompany food, we never drink water with food.” (Q25/P13/male/19 years)

“Well, yes, I mean with sweet beverages you can better accompany food and they are tastier.” (Q26/P19/male/18 years)

Carbonated beverage intake was particularly linked with Mexican dishes (e.g., tacos) and fast food (e.g., pizza or hamburgers), whereas iced tea and *aguas frescas* were associated with salads or dishes considered to be “healthier”:

“Well, if it is junk food, like maybe pizza or something like that, it’s generally with soda.” (Q27/P23/male/16 years)

“...for example, when they prepare tacos dorados [fried tacos], if it’s more Mexican, it’s better with Jamaica [hibiscus water] or something like that, you know... There is one dish that is perfect with [soda brand]; the tortas [Mexican sandwich] that my mom prepares; those need to be with [soda brand].” (Q28/P2/female/16 years)

“Salads from [local restaurant name], for instance, are with [iced tea brand] or Jamaica [hibiscus water] or lemonade, something like that.” (Q29/P28/female/17 years)

“Salads and all that are with [iced] tea, meats with soda...and Mexican dishes are with soda.” (Q30/P3/male/16 years)

Nonetheless, for some participants it was not important to have SSBs at home, but they explained that their families were the ones who considered it a necessity:

“To them it’s important, but it isn’t to me. For them it’s something that is always needed, and if there are none they buy or prepare them [SSBs].” (Q31/P28/female/17 years)

“Well, for me it’s not [important], but they [family members] like them [SSBs] a lot...I don’t know, they are used to drinking them [SSBs].” (Q32/P11/female/19 years)

The role of family in SSB intake at home

All adolescents in this sample lived with their parents and/or other family members. It was therefore essential to explore adolescents’ perceptions of how their families’ preferences and behaviours regarding SSBs might play a role in their own intake of SSBs at home. First, as mentioned previously, preferences for SSBs were evident among parents and family members:

“My dad likes to drink root beer...I associate [soda brand] with my mom because it’s the only thing she drinks.” (Q33/P26/female/17 years)

“My dad likes to drink coffee or Jamaica [hibiscus water]; she [mom] drinks water or soda, but she also drinks Jamaica [hibiscus water].” (Q34/P22/male/17 years)

Participants also indicated that one or more of their siblings also had certain preferences towards drinking SSBs:

“My brother does not like water, and, for example, if there is Jamaica [hibiscus water] he will have a bottle of

iced tea; he buys it and he drinks it all the time.” (Q35/P29/female/16 years)

“My sister likes iced tea a lot, she likes [iced tea brand], either the peach or lemon one, it doesn’t matter which.” (Q36/P21/male/18 years)

Some participants also mentioned other family members, such as grandparents, aunts and uncles, and their preferences towards SSBs. They cohabited in the same house, lived close or visited their homes often. This indicates that relatives other than parents and siblings can also influence the consumption of SSBs:

“My grandparents are coffee drinkers and whenever I go to their home they make iced tea for lunch; then I started to drink sweetened tea and then coffee with sugar when I was there and then I started to do the same in my house.” (Q37/P24/male/17 years)

“You know what influences me a lot? That we are always with my aunt. My mom and my aunt are always drinking coffee with sugar, or they are like: ‘We are craving soda’ and they buy and buy.” (Q38/P27/female/16 years)

A few participants stated that the preference for SSBs was a family thing:

“It’s because everyone likes [soda brand]; therefore, there will always be some [soda brand].” (Q39/P25/female/17 years)

“They [family] drink soda for breakfast, lunch and dinner, and coffee too.” (Q40/P18/male/17 years)

“The [soda brand] is the one that is very familiar; my dad drinks it; my mom drinks it and I ended up drinking it.” (Q41/P5/male/17 years)

A lot of participants felt that family members influenced the intake of SSBs at home by facilitating the availability of SSBs and by drinking SSBs with them as a shared family activity:

“But what also influences me in my house is that my brother and my mom buy soda all the time, and I see it [soda]; and it’s not just that I crave it [soda], I drink it because I see it there.” (Q42/P27/female/16 years)

“I tend to drink soda when I’m with my dad.” (Q43/P12/female/18 years)

Parental regulation and SSB intake at home

Within the ‘Role of family in SSB intake at home’ theme, parental regulation seemed to be an important factor. Most participants expressed that they were free to drink SSBs at home and that there was no rule preventing them from doing so:

“They have never banned any beverage or said: ‘Drink this’.” (Q44/P28/female/17 years)

“My mom doesn’t restrict them [SSBs]; well, I can’t remember her ever saying: ‘Don’t drink that!’.” (Q45/P9/male/17 years)

Others mentioned that some rules on SSBs and their availability at home existed. These restrictions seemed to be influenced by the level of health consciousness among the parents:

“My dad gets worried that I drink a lot of sugar and he always tells me ‘[participant’s name], you drink a lot of sugar’, so when I go to his house he won’t allow me to drink anything with sugar.” (Q46/P27/female/18 years)

In some cases, limiting the home availability of SSBs was the result of parents trying to lose weight or having a health condition, such as diabetes:

“Before, we used to drink a lot of [soda brand]; we did not buy many juices, but then my dad came out diabetic and we stopped buying; well, we stopped buying so much [soda brand]. Before, it was like three litres of soda a day, but since my dad has been sick we have stopped drinking so much [soda brand].” (Q47/P17/female/15 years)

“Well, my mom has always been on a diet eating salads and all that, and she tries to never buy [SSBs].” (Q48/P8/male/19 years)

In households where there were efforts to reduce SSB intake, some inconsistencies in maintaining healthy beverage habits over time were nevertheless highlighted by adolescents:

“Mmm, they used to say that [SSBs] are very bad, and in my family, they stopped drinking it, but then they would drink it again.” (Q49/P13/male/19 years)

“My mom says: ‘We already drink lots of soda; we are going to drink lemonade or Jamaica [hibiscus water], because we already drink a lot of soda and we have to

stop', and then we stopped for like two weeks only."
(Q50/P22/male/17 years)

SSB intake as habitual behaviour in the home environment

For some adolescents, drinking SSBs at home was regarded as habitual behaviour. For instance, some participants explained that drinking SSBs was a family habit, something they were used to doing or something that was common because their families had done it for many years, or for as long as they could remember:

"Soda is a habit of my parents, they got me used to it; it's innate...I do not know how this happened. I remember there was always soda or some type of sugary drink."
(Q51/P12/female/18 years)

"It could be a habit because it's what we have always drunk."
(Q52/P19/male/18 years)

Also, some adolescents thought that the constant home availability of SSBs throughout the years had led them to form a habit of consuming SSBs:

"It's always the same, so it's like we got used to drinking the same."
(Q53/P16/female/16 years)

"Soda has always been available."
(Q54/P12/female/18 years)

One of the components of habit is automaticity (Verplanken and Orbell 2003). Automatic processes are unconscious, that is, no mental effort is applied and therefore they tend to be fast (Moors and Houwer 2006; Orbell and Verplanken 2010). According to some participants the decision to drink SSBs at home was quick, possibly indicating some degree of automaticity. Participants also mentioned that the speed of their choice would depend on what types of drinks were available:

"It depends on what is there; if it's my favourite drink or one of my favourites, it's fast. If there are many drinks that I like, I'm slower to decide because I crave them all."
(Q55/P2/female/16 years)

"Well, I ask my mom what she prepared, if not I just drink juice."
(Q56/P5/female/17 years)

"At home it's fast, because I have juice and that is what I'm going to drink."
(Q57/P6/male/18 years)

Discussion

This study qualitatively explores the factors surrounding SSB intake in the home environment among a sample of adolescents living in an urban area in Northwest Mexico. Five emerging themes help to describe the role of the home environment in adolescents' intake of SSBs: (1) context of SSB availability at home; (2) facilitators of SSB availability at home; (3) perceived importance of having SSBs at home; (4) role of family in SSB intake at home; (5) SSB intake as habitual behaviour in the home environment. These findings highlight a number of barriers for current policies, but also present a number of opportunities for future interventions directed to the reduction of SSB intake among Mexican adolescents.

Previous evidence has suggested that home availability of SSBs is associated with the intake of SSBs in adolescents (Grimm et al. 2004; Ezendam et al. 2010; Tak et al. 2011; Hebden et al. 2013; Van Lippevelde et al. 2013). Our findings explain more profoundly how this correlation might occur because of potential facilitators of home availability in Mexican households. For instance, the belief that fruit-containing beverages, such as fruit beverages and *aguas frescas*, are healthy and therefore good to drink, was prominent among this sample of adolescents. Block et al. (2013) first introduced the term "health halo" to refer to young adults' beliefs with regard to the health benefits of juice. Earlier qualitative studies among Mexican children and Latino adolescents and their parents also emphasized the notion of the "healthfulness" of *aguas frescas* because of their fruit content and natural ingredients (Theodore et al. 2011; Bogart et al. 2013). Although the preparation of *aguas frescas* is more "natural" compared with other industrialised beverages, this "health halo" is likely to hinder adolescents' capacity to question what they drink and therefore requires attention. For example, the sugar content of *aguas frescas* is sometimes not acknowledged, as the amount of sugar in these beverages is subjective and based on an individual's taste during preparation. This suggests that looking at the sugar content of these beverages and identifying ways to reduce the amount of sugar added to homemade drinks could be a viable public health intervention. It is also important to recognise that the amount of sugar in these home beverages would not have been affected by the recent changes in SSB prices in Mexico, as the taxation only applies to bottled SSBs and not to homemade SSBs. Moreover, as suggested by Theodore et al. (2011), beverage marketing in Mexico has also contributed to the belief that fruit juices or other industrialised fruit-flavoured and fruit-containing beverages are "healthier". Educational strategies are therefore needed, not just for adolescents, but also for family gatekeepers, in order to inform the public about the sugar content of fruit beverages, as well as healthier

preparation of homemade beverages, and to promote water as the healthiest beverage of all.

Food intake, especially during lunchtime, seemed to be a facilitator of SSB consumption. This shows how embedded in routine and family practices SSB intake can be and is also consistent with previous findings from a qualitative study conducted among children in Mexico City, where a Mexican culinary rule of accompanying savoury food with sweet beverages was also identified (Theodore et al. 2011). Cultural norms play an important role in individual food choices, shaping personal eating patterns and food preferences, as well as defining what foods are eaten, when food is eaten and how it is prepared (Larson and Story 2009). By considering that accompanying food with SSBs is a cultural behaviour in Mexico, we could assume that it is learnt early in life through an enculturation process (when culture is transmitted from one generation to the next), so the phenomenon is deeply rooted (Larson and Story 2009). This could represent an obstacle when trying to reduce SSB intake in Mexican households as cultural beliefs and traditions might be difficult to change. It might also be the case that accompanying meals with SSBs is influenced by the marketing and globalization of the western diet, where accompanying certain (fast) foods with SSBs is presented as common practice (Larson and Story 2009; Reisch et al. 2013). Future interventions need to consider these factors in their design and identify ways to modify cultural norms and practices to reduce the intake of SSBs in adolescents.

Even though tap water is potable in this part of Mexico, our findings also suggest that water was not commonly used to accompany meals in this sample of adolescents. Participants often referred to the ease of purchasing SSBs compared with preparing beverages themselves or drinking water at lunchtime. Although serving a glass of water requires less effort than going out to purchase SSBs, this was not a frequent occurrence within the adolescents' home environment and further highlights the need to identify feasible and acceptable ways to promote water intake, particularly as an accompaniment to meals, as the beverage option of choice.

Parents appeared to influence adolescents' intake of SSBs, which could be explained by parental modelling and a lack of home rules regarding SSB intake at home. This is consistent with previous studies in European adolescents, where parental modelling (Grimm et al. 2004; van der Horst et al. 2007; Bere et al. 2008; Tak et al. 2011; Van Lippevelde et al. 2013) and permissive parenting practices in relation to food intake were associated with higher SSB intake (van der Horst et al. 2007; Verzeletti et al. 2010). Interestingly, our findings also suggest that siblings, grandparents and aunts/uncles can serve as role models and contribute to SSB availability at home, which adds to the limited evidence on the role of other family members in adolescent SSB intake. Thus, our research provides important insights into how wider family members' SSB intake patterns can influence adolescents' SSB consumption by

shaping the range of drinks available at home and making SSB drinking a common practice, integral to the family's identity. Therefore, the adolescents' capacity for reflecting on what they drink at home seems to be either neutralized or attenuated by their families' dietary practices. Future research should consider the role of parents and other family members in the intake of SSBs in Mexican youth by gathering more objective information from parents, or other close family members, to explore this association in depth. These findings could then be used to inform future behaviour change efforts.

Our findings with regard to exploring potential environmental cues that might promote habitual intake of SSBs suggest that availability seemed to trigger SSB intake. The presence of SSBs appeared to be consistent at home (i.e. always or almost always available) over the years, which prompted the behaviour and its repetition, eventually causing the automaticity of consuming SSBs, a characteristic of habitual behaviours. This is consistent with the findings of Tak et al. (2011), who also suggested that the availability and accessibility of SSBs at home may induce habit strength and automatic behavioural responses. The present study suggests that home eating occasions, together with the perceived importance of accompanying food with SSBs, also prompted repetition of the behaviour, making it a less cognitive decision and therefore more difficult for adolescents to have control over. This needs to be considered in future interventions, since modifying availability patterns could attenuate the context-behaviour association and therefore reduce the intake of SSBs among adolescents.

The current study provides in-depth information about how different home environmental factors shape and trigger the intake of SSBs in a sample of adolescents living in Northwest Mexico. To our knowledge, this is the first qualitative study to explore factors related to adolescents' SSB intake in the Mexican home context. However, the study is limited in terms of generalisability as the interviews were conducted in a single city in Northwest Mexico. Moreover, we had a homogeneous sample in terms of socio-economic status, as participants were mostly from middle and high socio-economic backgrounds. Therefore, we cannot know if the participant discourse would be different among low-income adolescents. Similarly, most of the participants were of normal weight, thus overweight and obese adolescents were underrepresented, so it is not known if their perceptions of the home environment in relation to SSB intake differ from those presented in this study. In our earlier cross-sectional work in this sample, we only collected data on the daily intake of SSBs, but we did not assess SSB intake separately for different eating occasions (e.g. at home, at school or other out-of-home activities). In addition to total daily intake, future studies should assess SSB intake in each individual context, as this will help the development of targeted interventions to reduce SSB consumption.

Conclusion

Our findings in this sample of Mexican adolescents support the notion that the home environment, including availability, perceived importance and family influences, contributes to adolescents' SSB intake. Results also highlighted the significance of habitual behaviours and cultural and family norms in influencing the intake of SSBs in Mexican youth. These factors need to be considered when designing interventions intended to modify SSB intake among Mexican adolescents and their families. Such schemes could complement the national SSB taxation policy currently in force (Colchero et al. 2017) by directly addressing availability and facilitators of SSB intake at home, family influences and parental regulation.

Acknowledgments We would like to thank Renee Mendoza and Lucia Ortega for their help in the recruitment of participants. We also want to thank all adolescents who participated in the interviews.

Author contribution AO formulated the research question(s), designed the study, collected and analysed the data and wrote the manuscript. AP and RJ assisted in the study design and provided critical input and revision to the manuscript. All authors approved the final version of the manuscript.

Funding This work was supported by the Mexican Council of Science and Technology (CONACyT) as a PhD studentship to A.G. Ortega-Avila. CONACyT had no role in the design, analysis or writing of this article.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval This study was conducted according to the guidelines laid down in the Declaration of Helsinki and the procedures involving human subjects/patients were approved by the University of Bristol, School for Policy Studies Research Ethics Committee.

Informed consent Written informed consent was obtained from all individual participants included in the study.

Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

References

- Al-Amer R, Ramjan L, Glew P, Darwish M, Salamonson Y (2015) Translation of interviews from a source language to a target language: examining issues in cross-cultural health care research. *J Clin Nurs* 24:1151–1162. <https://doi.org/10.1111/jocn.12681>
- Baker SE, Edwards R (2012) How many qualitative interviews is enough? Expert voices and early career reflections on sampling and cases in qualitative research. National Centre for Research Methods, Southampton, UK
- Barquera S, Hernandez-Barrera L, Tolentino ML, Espinosa J, Ng SW, Rivera JA (2008) Energy intake from beverages is increasing among Mexican adolescents and adults. *J Nutr* 138:2454–2461. <https://doi.org/10.3945/jn.108.092163>
- Barquera S, Campirano F, Bonvecchio A, Hernandez-Barrera L, Rivera JA, Popkin BM (2010) Caloric beverage consumption patterns in Mexican children. *J Nutr* 9:47. <https://doi.org/10.1186/1475-2891-9-47>
- Bates B, Cox L, Nicholson S, Page P, Prentice A, Steer T, Swan G (2016) National Diet and Nutrition Survey: Results from Years 5 and 6 (combined) of the Rolling Programme (2012/2013–2013/2014). Public Health England, London
- Bere E, Glomnes ES, te Velde SJ, Klepp KI (2008) Determinants of adolescents' soft drink consumption. *Public Health Nutr* 11:49–56. <https://doi.org/10.1017/s1368980007000122>
- Birbili M (2000) Translating from one language to another. *Social Research Update* (issue 31). <http://sru.soc.surrey.ac.uk/SRU31.html>. Accessed 20 Oct 2017
- Block JP, Gillman MW, Linakis SK, Goldman RE (2013) “If it tastes good, I’m drinking it”: qualitative study of beverage consumption among college students. *J Adolesc Health* 52:702–706. <https://doi.org/10.1016/j.jadohealth.2012.11.017>
- Bogart LM, Cowgill BO, Sharma AJ, Uyeda K, Sticklor LA, Alijewicz KE, Schuster MA (2013) Parental and home environmental facilitators of sugar-sweetened beverage consumption among overweight and obese Latino youth. *Acad Pediatr* 17:348–355. <https://doi.org/10.1016/j.acap.2013.02.009>
- Bogart LM, Elliott MN, Ober AJ, Klein DJ, Hawes-Dawson J, Cowgill BO, Uyeda K, Schuster MA (2017) Home sweet home: parent and home environmental factors in adolescent consumption of sugar-sweetened beverages. *Acad Pediatr* 17:529–536. <https://doi.org/10.1016/j.acap.2017.01.015>
- Colchero MA, Molina M, Guerrero-López CM (2017) After Mexico implemented a tax, purchases of sugar-sweetened beverages decreased and of water increased: difference by place of residence, household composition, and income level. *J Nutr*. <https://doi.org/10.3945/jn.117.251892>
- Erickson J, Slavin J (2015) Total, added, and free sugars: are restrictive guidelines science - based or achievable? *Nutrients* 7:2866–2878. <https://doi.org/10.3390/nu7042866>
- Esposito N (2001) From meaning to meaning: the influence of translation techniques on non-English focus group research. *Qual Health Res* 11:568–579. <https://doi.org/10.1177/104973201129119217>
- Ezendam NP, Evans AE, Stigler MH, Brug J, Oenema A (2010) Cognitive and home environmental predictors of change in sugar-sweetened beverage consumption among adolescents. *Br J Nutr* 103:768–774. <https://doi.org/10.1017/s0007114509992297>
- Gale NK, Heath G, Cameron E, Rashid S, Redwood S (2013) Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol* 13:117
- Gardner B, Sheals K, Wardle J, McGowan L (2014) Putting habit into practice, and practice into habit: a process evaluation and exploration of the acceptability of a habit-based dietary behaviour change intervention. *Int J Behav Nutr Phys Act* 11:135. <https://doi.org/10.1186/s12966-014-0135-7>
- Grimm GC, Harnack L, Story M (2004) Factors associated with soft drink consumption in school-aged children. *J Am Diet Assoc* 104:1244–1249. <https://doi.org/10.1016/j.jada.2004.05.206>
- Haerens L, Craeynest M, Deforche B, Maes L, Cardon G, De Bourdeaudhuij I (2008) The contribution of psychosocial and home environmental factors in explaining eating behaviours in

- adolescents. *Eur J Clin Nutr* 62:51–59. <https://doi.org/10.1038/sj.ejcn.1602681>
- Hebden L, Hector D, Hardy LL, King L (2013) A fizzy environment: availability and consumption of sugar-sweetened beverages among school students. *Prev Med* 56:416–418. <https://doi.org/10.1016/j.ypmed.2013.02.017>
- Hedrick VE, Savla J, Comber DL, Flack KD, Estabrooks PA, Nsiahkumi PA, Ortmeier S, Davy BM (2012) Development of a brief questionnaire to assess habitual beverage intake (BEVQ-15): sugar-sweetened beverages and total beverage energy intake. *J Acad Nutr Diet* 112:840–849. <https://doi.org/10.1016/j.jand.2012.01.023>
- Hernández Ávila M, Rivera Dommarco J, Shamah Levy TL, Cuevas Nasu LM, Gómez Acosta EG, Pineda B, Romero Martínez M, Méndez Gómez-Humarán I, Saturno Hernández P, Villalpando Hernández S, Gutiérrez JP, Ávila Arcos MA, Mauricio López ER, Martínez Domínguez J, García López DE (2016) Encuesta Nacional de Salud y Nutrición de Medio Camino 2016. Informe final de resultados. Instituto Nacional de Salud Publica, Mexico
- Jimenez-Aguilar A, Flores M, Shamah-Levy T (2009) Sugar-sweetened beverages consumption and BMI in Mexican adolescents: Mexican National Health and nutrition survey 2006. *Salud Publica Mex* 51: 604–612
- Kremers SJ, van der Horst K, Brug J (2007) Adolescent screen-viewing behaviour is associated with consumption of sugar-sweetened beverages: the role of habit strength and perceived parental norms. *Appetite* 48:345–350. <https://doi.org/10.1016/j.appet.2006.10.002>
- Larson N, Story M (2009) A review of environmental influences on food choices. *Ann Behav Med* 38:56–73. <https://doi.org/10.1007/s12160-009-9120-9>
- Lincoln YS, González EM, Aroztegui MC (2016) “Spanish is a loving tongue...”: Performing qualitative research across languages and cultures. *Qual Inq* 22:531–540. <https://doi.org/10.1177/1077800416636148>
- Malik VS, Pan A, Willett WC, Hu FB (2013) Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *Am J Clin Nutr* 98:1084–1102. <https://doi.org/10.3945/ajcn.113.058362>
- Moors A, De Houwer J (2006) Automaticity: a theoretical and conceptual analysis. *Psychol Bull* 132:297–326. <https://doi.org/10.1037/0033-2909.132.2.297>
- Orbell S, Verplanken B (2010) The automatic component of habit in health behavior: habit as cue-contingent automaticity. *Health Psychol* 29:374–383. <https://doi.org/10.1037/a0019596>
- Ortega-Avila AG, Papadaki A, Jago R (2018) Exploring perceptions of the Mexican sugar-sweetened beverage tax among adolescents in north-west Mexico: a qualitative study. *Public Health Nutr* 21(03): 618–626. <https://doi.org/10.1017/S1368980017002695>
- Reisch AL, Gwozdz W, Barba G, De Henauw S, Lascorz N, Pigeot I (2013) Experimental evidence on the impact of food advertising on children’s knowledge about and preferences for healthful food. *J Obes* 2013:13. <https://doi.org/10.1155/2013/408582>
- Sánchez-Pimienta T, Batis C, Lutter CK, Rivera JA (2016) Sugar-sweetened beverages are the Main sources of added sugar intake in the Mexican. *J Nutr* 146:1888S–1896S. <https://doi.org/10.3945/jn.115.220301.1S>
- Shi L (2010) The association between the availability of sugar-sweetened beverage in school vending machines and its consumption among adolescents in California: a propensity score matching approach. *J Environ Public Health* 2010:735613. <https://doi.org/10.1155/2010/735613>
- Smith J, Firth J (2011) Qualitative data analysis: the framework approach. *Nurs Res* 18(2):52–62
- Stern D, Piernas C, Barquera S, Rivera JA, Popkin BM (2014) Caloric beverages were major sources of energy among children and adults in Mexico, 1999–2012. *J Nutr* 144:949–956. <https://doi.org/10.3945/jn.114.190652>
- Tak NI, Te Velde SJ, Oenema A, der Horst K, Timperio A, Crawford D, Brug J (2011) The association between home environmental variables and soft drink consumption among adolescents. Exploration of mediation by individual cognitions and habit strength. *Appetite* 56: 503–510. <https://doi.org/10.1016/j.appet.2011.01.013>
- Theodore F, Bonvecchio A, Blanco I, Irizarry L, Nava A, Carriedo A (2011) Culturally constructed meanings for consumption of sweetened beverages among schoolchildren in Mexico City. *Rev Panam Salud Publica* 30:327–334
- van de Gaar VM, van Grieken A, Jansen W, Raat H (2017) Children’s sugar-sweetened beverages consumption: associations with family and home-related factors, differences within ethnic groups explored. *BMC Public Health* 17:195. <https://doi.org/10.1186/s12889-017-4095-0>
- van der Horst K, Kremers S, Ferreira I, Singh A, Oenema A, Brug J (2007) Perceived parenting style and practices and the consumption of sugar-sweetened beverages by adolescents. *Health Educ Res* 22: 295–304. <https://doi.org/10.1093/her/cyl080>
- van der Horst K, Timperio A, Crawford D, Roberts R, Brug J, Oenema A (2008) The school food environment: associations with adolescent soft drink and snack consumption. *Am J Prev Med* 35:217–223. <https://doi.org/10.1016/j.amepre.2008.05.022>
- Van Lippevelde W, te Velde SJ, Verloigne M, De Bourdeaudhuij I, Manios Y, Bere E, Jan N, Fernández-Alvira JM, Chinapaw MJM, Bringolf-Isler B (2013) Associations between home-and family-related factors and fruit juice and soft drink intake among 10-to 12-year old children. The ENERGY project. *Appetite* 61:59–65
- van Nes F, Abma T, Jonsson H, Deeg D (2010) Language differences in qualitative research: is meaning lost in translation? *Eur J Ageing* 7: 313–316. <https://doi.org/10.1007/s10433-010-0168-y>
- Verplanken B, Orbell S (2003) Reflections on past behavior: a self-report index of habit strength. *J Appl Soc Psychol* 33:1313–1330. <https://doi.org/10.1111/j.1559-1816.2003.tb01951.x>
- Verzeletti C, Maes L, Santinello M, Vereecken CA (2010) Soft drink consumption in adolescence: associations with food-related lifestyles and family rules in Belgium Flanders and the Veneto region of Italy. *Eur J Pub Health* 20:312–317. <https://doi.org/10.1093/eurpub/ckp150>